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TIMBER RESOURCES OF NEW ENGLAND AND NEW YORK WITH REFERENCE TO PULPWOOD SUPPLIES

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Pulp and paper is the most important of the wood-using industries of the Northeast. In value of product, value added by manufacture, and number of persons employed, it exceeds any other, but like all the others it is having increasing difficulties in procurement of timber supplies. Many of the pulp and paper mills have reached the stage where they are running out of local timber.

The raw material supply problem has been met, in part, by imported pulpwood. Canada now provides the mills of New England and New York with one-third of the pulpwood that is used. But the pulp and paper industry in Canada has also been expanding very rapidly in the last 40 years. The pressure on raw material supplies is developing there too. The pulpwood forests of eastern Canada are, right now, in the throes of the worst budworm epidemic ever experienced. Millions and millions of cords of spruce and fir timber have been killed. The budworm attack, in progress in Canada since 1938, has now begun in the forests of the Adirondacks. The total situation gives deep concern to all the pulpwood producers and pulp mills of the Northeast.

The 59 Northeastern mills draw their domestic wood from about 42 million acres of commercial forest land. It is of interest to consider this forest area by its four major forest types.

1. The spruce-fir type, most important from the pulpwood standpoint, is located in the northern half of the region and consists mainly of

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1/ Presented at the fall meeting of the Technical Association of the Pulp and Paper Industry, Detroit, Mich., Sept. 26-28, 1946. Published in Pulpwood - Stands, Procurement, and Utilization (TAPPI Monograph Series No. 4). 1946.

Table 1.--Number of pulp mills by states, 1944

Maine	20
New Hampshire	4
Vermont	3
Massachusetts	2
Rhode Island	1
New York	29
Total	59

spruce and fir in mixture with hemlock, cedar, pine, and northern hardwoods such as beech, birch, and maple. These forests account for nearly 19 million acres of New England and New York's commercial forest area and they supply the bulk of the domestic pulpwood consumed by northeastern mills.

2. Then there is the white pine-hardwoods type that occurs chiefly in lower Maine and New Hampshire and the Champlain Valley of Vermont and New York. These forests account for another 10 million acres. It is from this forest type that mills have recently started drawing white pine pulpwood.

3. The northern hardwoods form a third important type in which some pulpwood is produced. These forests occur over nearly 8 million acres and extend generally through the central portion of New England and New York.

4. The oak-pine forests are located principally in lower New England and New York where oak is the dominant wood. This forest type covers about 5 million acres. So far, the timber in these forests has been little used for pulpwood.

The high importance of spruce and fir as raw material for northeastern pulp is indicated by the fact that these two species constitute more than two-thirds of the 2 million cords or more of domestic pulpwood used. Their proportion in the imported pulpwood is even higher. Aspen represents about 13 percent of the pulpwood used; about half of it comes from Canada. Hardwoods other than aspen make up about 10 percent. The other 10 percent is composed of miscellaneous conifers: hemlock, pine, etc. Obviously, it is the spruce-fir stands that are of primary concern as a source of pulpwood supply.

The timber supply situation

Before considering the pulpwood supply problem in more detail, it may be well to look at the timber supply situation as a whole.

The total volume of the timber stand on commercial forest land in New England and New York is about 493 million cords. Of this total,

Table 2.--Timber volume[1] in New England and New York, status beginning of 1945

(million cords)

Softwoods		Hardwoods	
Spruce and fir	103	Birch, beech and maple	248
White and Norway pine	40	Oak	30
Hemlock	28	Aspen	17
Other	7	Other	20
Total	178	Total	315

1/ Trees 5 inches d.b.h. and larger; does not include bark. Converting factors: Softwood, 1 cord = 78 cu. ft.; hardwoods, 1 cord = 65 cu. ft.

178 million cords are softwoods and 315 million cords are hardwoods (table 2).

When white men first set foot in this region, the volume of softwood exceeded that of hardwood. Now the proportions are heavily the other way. Only about 35 percent of the present growing stock is in softwoods, less than 20 percent is in spruce and fir.

There are about 3,500 primary plants (table 3) in New England and New York manufacturing wood products. Raw material to supply these plants plus that used as fuel wood, fence posts, hewn ties, and other round and split wood products involves an annual drain of nearly 12 million cords from the forests of this region. Another 2 million cords are lost through fires, forest insects, and diseases, and other destructive agents. The total annual drain (table 4) is about 14 million cords. The commodity drain--that is, the drain for lumber, pulpwood and other forest products used--is about evenly divided between softwoods and hardwoods.

These bare figures indicate some of the pressure upon the softwood resources. It becomes still more clear when we consider the relation of current annual drain to current annual growth (table 5). The fact that New England and New York forests show a net surplus in total growth over total drain gives no comfort to anyone interested in pulpwood supplies. Most of this surplus is in the hardwood timber--much of it in poor-quality trees. The long-term depletion of the softwood forest resources has apparently not yet been halted, even with a large import of these

Table 3.--Kind and number of primary forest products plants in New England and New York, 1944

Lumber	2,843
Pulpwood	59
Veneer	50
Cooperage stock	55
Turning, bobbins, lasts, etc.	470
Total	3,477

Table 4.--Timber drain from commercial forests in New England and New York

(Thousand cords)

Kind of drain	Soft-woods	Hard-woods	Total
Commodities 1/	5,194	6,427	11,621
Fire, insects, etc. 2/	560	1,613	2,173
Total	5,754	8,040	13,794

1/ Timber cut in 1944.
2/ Timber removed by destructive agencies, an average for the 10-year period 1934-43.

In short, the excess of growth over drain is in hardwoods. This is the growth that is not now being utilized and it is the material for which uses have been the hardest to find. The pulp and paper industry is, of course, aware of this fact. It has made some progress in expanding the use of hardwoods for pulp.

In addition to the reduction in growing-stock volume there has been serious deterioration in quality. Spruce is giving way to fir and to hardwoods. White pine occupies less space now relative to hardwoods then formerly and the trees are smaller and of poorer quality. A competition between the lumber industry and the pulp industry for white pine timber is now beginning.

Table 5.--Comparison of annual drain and growth, status beginning of 1945

(Thousand cords)

Item	Drain	Growth 1/	Surplus
Softwoods	5,754	6,449	695
Hardwoods	8,040	12,092	4,052
Total	13,794	18,541	4,747

1/ Annual growth of all trees 5 inches d.b.h. and larger, including tops and limbs (tops only in softwoods) of saw-timber trees and total volume of trees reaching 5 inches d.b.h. each year. Bark not included.

woods from Canada! The softwoods, regionwide, are being cut and otherwise taken at a rate about equal to growth. But a considerable part of the annual softwood growth is in areas remote from transportation and is not always available when it should be cut. A considerable volume of the short-lived balsam fir is not usable for just this reason. It can also be safely said that the growth of the more valuable spruce is being replaced by balsam fir--a species that is more vulnerable to budworm attack. Hardwoods are also encroaching more and more upon the softwoods in the mixed stands.

Management of the spruce-fir forests

These evidences of poor management of the Northeast's forests are particularly pronounced in the spruce-fir forests which for these many years have been the mainstay of the pulp and paper industry. Heavy cuttings, without proper regard to size and amount of softwood reproduction, have often permitted hardwoods to take possession of the land. Damage to young growth through careless logging, smothering of reproduction from dense slash accumulations, suppression from myriads of young competing hardwood stems which follow clear-cutting operations, as well as fire over extensive areas, have all contributed materially to spruce-fir stand deterioration. As a result, thousands of acres of former spruce-producing land now support only aspen, pin cherry, red maple sprouts, and other inferior hardwoods. The common practice of operating lands only for spruce and fir has converted extensive areas of mixed spruce-hardwood stands to pure hardwoods.

Another bad effect of clear-cutting all merchantable-size trees has been the long period between cuts. There has been a heavy loss in trees which have died between loggings where a new stand of spruce and fir develops. This accumulated mortality often exceeds the final harvest. The effect of clear-cutting has been to reduce spruce-fir growing stock near the mills. Forward-looking concerns appreciate the fact that the ultimate salvation of their industry lies in making lands tributary to their mills produce the required amount of raw material.

From a regional standpoint the most urgent pulpwood problem is to increase the estimated net spruce-fir current annual growth of some 1,435,000 cords to equal or exceed the present over-all cut of approximately 1,835,000 cords. Thus there is needed an annual increase of spruce-fir growth of approximately 400,000 cords to bring growth into balance with cut. Another problem is to bring the forest growth to the point where it will meet the future requirements of the industry. Assuming that the present mill capacity (groundwood and sulphite) approximately represents future requirements, an ultimate annual growth of nearly 3½ million cords would be required.

The estimated 1½ million cords annual growth of the Northeast's spruce-fir forests is a far cry from the present mill capacity of 3½ million cords, yet these forests under improved forest practices can be made to supply not only the requirements of established mills but also to support a substantial allied forest products industry.

What needs to be done?

Achievement of this goal would involve placing about 19 million acres of spruce-fir producing forests under sustained yield management varying in intensity according to accessibility and geared not only to supply the pulp and paper industry but other wood-using industries dependent on these forests as well.

Although full advantage should be taken of supplementary measures such as expanded use of hardwoods, main reliance for achieving a satisfactory level of pulpwood production must be placed on the application of sound forestry measures. These should be aimed primarily at increasing timber growth and making more effective use of the productive capacity of the land. Briefly, this means the employment of cutting methods which will bring distant over-ripe stands into an active producing state, stimulate adequate restocking in stands lacking reproduction, insure normal development of advance reproduction where it already exists, create favorable conditions for building up growing stock and increasing the growth rate, and initiate operating cycles which will permit harvesting a greatly increased proportion of the stand's growth.

Most of the above objectives can be achieved, we believe, through the use of the partial or selection cutting system with its accompanying short cutting cycle. Such a system would be greatly facilitated by the development of a permanent road system. This will become a feasible undertaking in remote country only when sufficient wood volume is available to justify its construction and maintenance.

Extensive areas of northern hardwoods suitable for pulping occur in mixture with spruce and fir or in solid bodies interspersed throughout the spruce-fir region. Better cooperation between pulpwood operators and other industries that can use hardwood logs and bolts should facilitate the removal of more hardwoods. An adequate road system would make it possible to log hardwoods at a cost low enough to assure them a market. In addition, any development which broadens the utility of these hardwoods or other species for pulp lessens the pressure for cutting the already overcut spruce-fir stands. Establishment of road systems would promote not only integrated logging but better utilization which in turn would make intensified forest management in both the spruce and hardwood forests of the region a feasible undertaking. Moreover, it would make more feasible a presalvage cutting plan--to take the high-hazard trees as soon as possible in order to reduce losses from the impending budworm attack.

A look ahead

We can, of course, continue down the path of depletion and deterioration. Some of the region's pulp and paper mills can eke out an existence by further consumption of white pine growing stock. Some of the softwood lumber mills can turn to hardwoods in order to stay in business. Pulp and lumber manufacturers, alike, can learn to use more and more of the inferior species and poorer quality trees but at an increased cost to themselves and hence to consumers. In following this downward path, however, there will be an ever-tightening timber supply. The wood available will become progressively inferior and the industries will be a great deal poorer than they would have been had they taken advantage of the fact that New England's and New York's commercial forests are renewable. The policy which will contribute most to the

region's timber supplies, and to its wealth, is to cultivate the growing stock toward a higher level of growth and drain.

The pulp and paper industry can do much to promote such a policy. There are over 10 million acres of forest land in New England and New York that are in holdings of more than 50,000 acres each. Most of these are in the spruce-fir country and under the control of pulp manufacturers and pulpwood producers. How these forest properties are managed is their direct concern. The balance of the spruce-fir forest type is in little holdings that belong to thousands of small owners. On these lands the interest of pulp and paper industry is still large although its responsibility for management practices is less direct. An expanded pulpwood market for the lower grade hardwoods would reduce some of the present obstacles to better forest practice on small holdings as well as on pulp industry lands.

In summary, these are the practices which I would list as important to progress toward an increased pulpwood supply. They are all closely related.

1. An expanded use of hardwoods. Recent trends toward greater use of hardwoods for pulp ought to be speeded up. This, of course, requires intensive research and experimentation along many lines extending all the way from tree stump to finished product--log and cordwood transportation, wood storage and handling at the mill, removal of bark and chipping, pulping processes, refining and bleaching, special treatments to reduce the short-fiber handicap, experiment with blends of hardwood pulps in the "furnish", special adjustment or design of paper machines.

2. Better cutting practices aimed specifically at overcoming deficiencies in the growing stock. In essence this means leaving bigger and better growing stock, and of a kind that is pest-resistant. It means, for northern forests, the switching from clear-cutting and long cutting cycles to light cuttings at frequent intervals. It means more utilization roads in much of the spruce-fir country. The results will be a progressively bigger harvest, partly in the form of greater use of present growth and partly in the form of stepped-up future growth. It is heartening to see the trend, already clearly evidenced on the part of industry, toward shorter cycle cutting. A number of concerns are now cutting in a manner that permits a return for another harvest in 30 years instead of the older and more general practice of clear-cutting everything merchantable every 60 years. Moreover, many large forest land owners are very actively cooperating with the Northeastern Station in an attempt to work our further improved forest management practices that are practicable of application. Our Station has recently expanded its forest management research in this forest type and our experiments to date indicate that it would not be difficult for many owners of spruce-fir forests to at least double their yields. The present average growth of spruce and

fir is estimated at about one-tenth cord per acre per year. Even though that rate were doubled or tripled, it would still be far short of the growth obtained for many years in the managed forests of northern Europe and Japan.

3. More effective protection is essential. In a large sense this is an added reason for better cutting practices rather than another measure. Reasonably adequate fire protection in this region is an accomplished fact, but this is not the case for disease, wind, and especially insects. Many land owners, timber operators and foresters are concerned about the danger of wind and of insects in particular. The wallop from the 1938 hurricane, the heavy loss from the spruce budworm early in the century, and the depredations of other insects are fresh in their minds. Now, looming on the horizon, the spruce budworm is again threatening. And there appears to be little that can be done practically in direct control of any of them. Entomologists and pathologists have pointed out that better silviculture oriented toward quick utilization of decadent or slow-growing timber and toward development of a thrifty, well-stocked forest may be the only sure-fire safeguard against serious volume loss.

The very real danger of a devastating budworm attack hovering over the Northeast is a strong argument in itself for better management of spruce-fir forests. If these stands are further depleted, a major wood-using industry in the Northeast will suffer at least a partial collapse. I hold that the pulp and paper industry cannot afford to lose any opportunity to practice better forestry on its own lands and to promote, in any feasible way, the practice of better forestry on the lands of others.